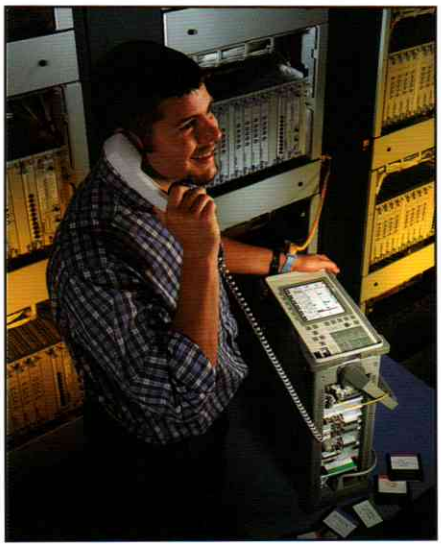
HEWLETT® PACKARD

Helping you optimize network performance

Test and measurement solutions for the telecommunications industry



Test and measurement solutions for the telecommunications industry

Helping you optimize network performance

As a telecom network operator, you provide the essential services that connect us all together and carry the voice and data information important to our business and personal lives. Over the years, you have had to continuously expand and improve your network, while keeping prices competitive – quite an accomplishment.

Today, the pace of change is accelerating as you incorporate new capabilities based on ISDN, cellular radio, common channel signaling, SONET/SDH, and lightwave transmission. All the while, you have to keep a large and valuable network operating at peak efficiency.

At Hewlett-Packard, we appreciate the challenge you face, and we want to help. Think of us as insurance for your reputation. If your biggest customer experiences network failure, your company's reputation could be seriously damaged. When something that valuable is at stake, you need a partner who can give you the assurance that your networks will continue to meet and exceed your customers' expectations.

We'll help you solve network problems your customers don't even know you have. HP is the company that offers extensive expertise in both test and computation. This comprehensive knowledge allows us to offer you complete test systems, not just boxes. That's a significant advantage in this age of shrinking staff and tighter budgets.

The test performance with the service that you need

HP provides over 100 test solutions to help you install and maintain networks – from portable protocol analyzers to integrated monitoring systems. In fact HP has the world's largest range of telecommunication test equipment.

The product, however is only the start of the story. You need a vendor that can offer a commercially satisfactory solution and provide you the pre- and post-sales support that you need.

From a commercial perspective, HP offers finance and lease plans to give you the flexibility you need to meet changing deadlines from your customers.

In particular, HP has many years experience working with some of the world's largest telecom service providers, delivering test instruments and systems that meet their exacting requirements. HP's telecom specialists have accumulated a great deal of valuable applications knowledge and training material that can assist you as you bring your network on stream.

You can gain access to our vast experience in test and measurement applications and technologies through our consultants, applications engineers, and systems experts around the world.

Consultation and support services

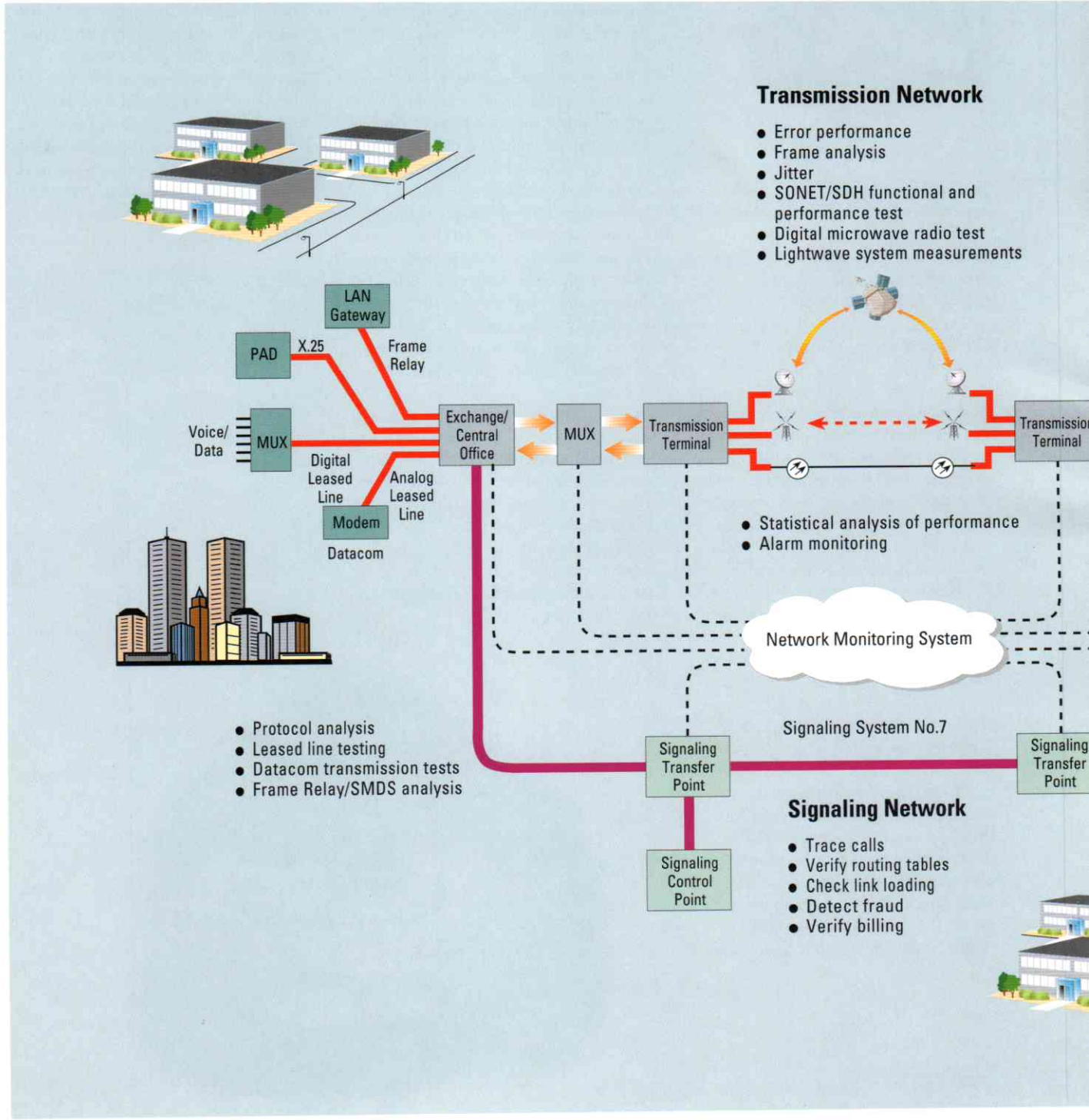
Beyond standard products, Hewlett-Packard has created a continuum of test products, solutions, and services to meet your specific needs in the telecommunications industry. Those needs can include customized test products, fully integrated test solutions based on your specific applications, and can even include help in the planning, development, and operational phases of your installation and maintenance strategy.

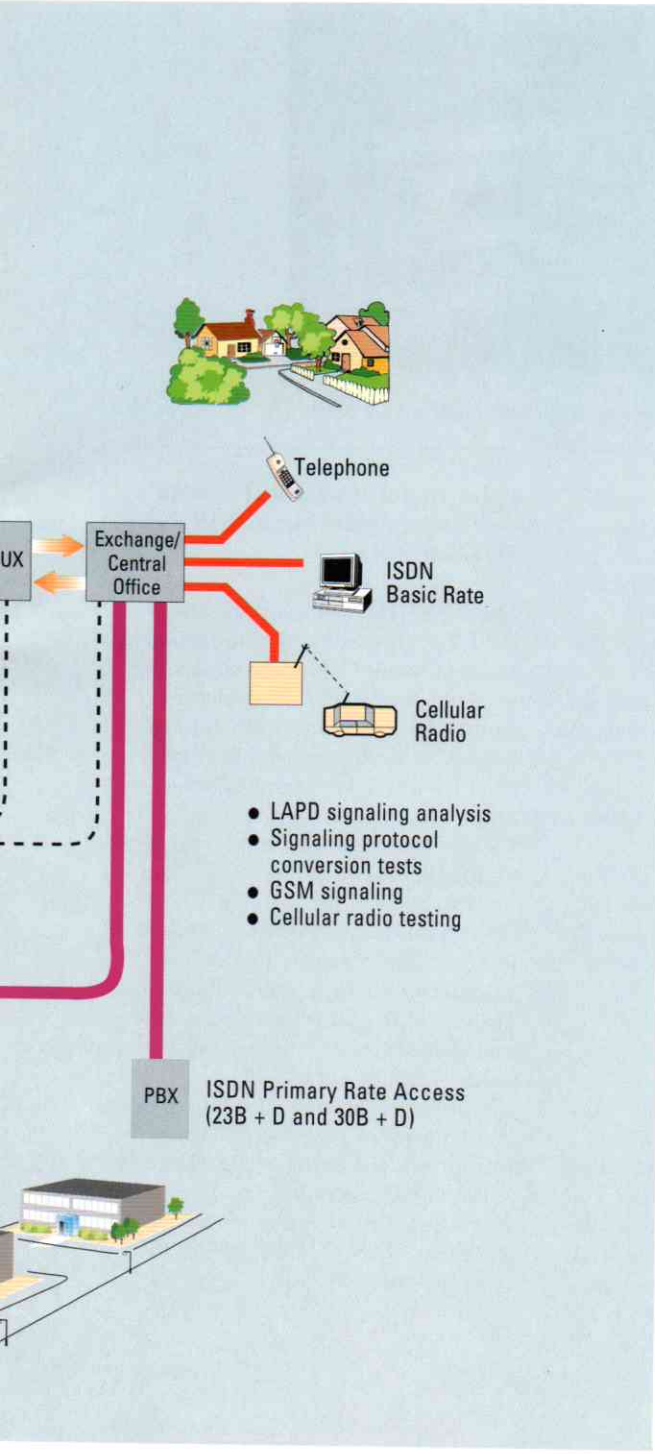
If you are analyzing your current strategy and aren't sure where to focus your efforts, HP's consultants can help walk you through the decision process, provide insight into how similar processes and strategies have been executed elsewhere, and make recommendations based on your overall objectives. The goal is to create the "right" strategy for your operation.

Our commitment to your success doesn't stop when your solution is delivered, we can also assist you with our comprehensive portfolio of support services. By choosing HP as your support partner you get the unparalleled technical capability and experience of our expert technicians, equipped with the latest technology. Our extensive range of support services is available for both HP and non-HP test and measurement equipment, to give you the convenience of working with a single vendor. We also specialize in working with you to tailor solutions to your specific requirements.

Business success today also requires optimal resource allocation. To help you get the greatest return on your test and measurement resources, we can provide you with a full range of additional services. Education Services provide the training you need to get the most out of your test and measurement products and systems, Start-Up Assistance helps you get up and running faster, our Application Consulting and Customization services can help you keep your test systems competitive and cost-effective for years to come, and our Equipment Acquisition and Financial services can help make the selection and purchasing of your test and measurement equipment as efficient as possible.

Helping you optimize network performance





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Datacom and LAN interconnection

The increasing complexity of customer premises equipment demands a wide range of test capability. HP provides integrated monitoring and analysis solutions for an extensive range of LAN, WAN, and ATM data communications networks. The instruments' convenient size and rugged packaging lets you take the solution to the problem.

Programmable WAN and ISDN tester for flexibility and power

Use the HP PT500 WAN and ISDN Protocol Tester to verify that new network equipment works properly during evaluation. A flexible script-writing environment, combined with the comprehensive protocol routine library, simplifies the building of complex custom test scripts. Protocols supported include: X.25, ISDN, SS No.7, frame relay, SNA, BSC, Group 4 Fax, and X.75. The port configuration lets you simulate and monitor protocols and signaling at ISDN basic rate, primary rate and WAN interfaces simultaneously.

Testing and certification

The first step towards more reliable networks is to verify that the communications equipment properly implements the ISDN protocol variant in use. The HP PT500 provides a range of automated executable test suites based on test standards. Complete conformance test software verifies correct protocol behavior in normal and errored conditions. Conformance tests are easy to run. Simply load, select and execute.

SMDS, frame relay and high-speed X.25 tester at 2 Mb/s

Whether you are building new LAN interconnection products or commissioning an SMDS service, testing for reliability and finding errors quickly is crucial to your success. The dual T1-E1-WAN option of the HP PT502 Protocol Tester supports dual-port testing of frame relay and/or SMDS simultaneously at 2 Mb/s.

As many telephone operators have found during their field trials, finding errors with the HP PT502 is often quite easy. The HP PT502 not only highlights errors in red, but the high-level decodes name the errors in English.

Frame relay conformance testing

Verify the compliance of frame relay equipment according to the latest ANSI, ITU-T and FRF standards. This test abstract was defined by the Frame Relay Forum/National ISDN Users Forum (NIUF), UNI and NNI PVC standards. Also available are ITU-T Q.933 Annex A, UNI PVC test suite and a Japanese variant of UNI testing.

Point-to-point protocol simulation and monitoring for HP PT Series testers

The HP E6284A software for the HP PT Series stimulus-and-response protocol testers adds new capability for point-to-point (PPP) protocol simulation and monitoring applications. Comprehensive support for the PPP link layer includes automatic detection of compressed PPP headers and decoding and encoding of all link control protocol (LCP) and network control protocol (NCP) identifiers. A multilink setup menu lets you configure the bundle relationship between individual physical PPP link prior to simulation and monitoring of multiple links. IP protocol information fields are decoded and encoded, and filters and triggers are supported. All field interpretations of the PPP software's supported components are derived from the Internet Assigned Numbers Authority (IANA)'s most recent PPP field assignments.

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
Visit our website: http://www.tmo.hp.com

Integrated monitoring and analysis for WAN, LAN and ATM – all under one handle

The HP J2300 Internet Advisor helps you identify and solve problems correctly the first time you connect, anywhere in the internetwork, and maximizes network uptime by isolating network problems before they occur. With the capability to baseline network behavior, the HP Internet Advisor provides critical information for intelligently optimizing, reconfiguring, fine-tuning and expanding enterprise networks. This gives you the ability to:

Connect in virtually any network environment, including internetworked LAN, WAN and ATM environments and through the World Wide Web. Slide-in modules and undercradles provide access to all major interfaces and any network technology.

Capture all of the data in your network at even the highest speed, allowing complete visibility of network problems. The use of RISC processors and custom hardware ensures that you get all the data you need for fast problem solving.

Comprehend as the HP Internet Advisor reveals problems reliably, automatically analyzes collected data, tells you what the problems are, who is causing them and what you need to do to solve them:

- Automatic expert analysis and network health reporting
- Vitals help you anticipate and solve problems before they occur
- Commentators point you to the source of the problem in plain English
- LAN over WAN analysis
- LAN over ATM analysis
- Customizable statistical analysis
- Extensive on-line help.

The HP Internet Advisor supports:

LAN
- 10 Mb/s Ethernet, Fast Ethernet Gigabit Ethernet and Switched Ethernet
- Token Ring
- FDDI.

WAN
- Frame Relay, ISDN, X.25, SMDS
- Encapsulated LAN over WAN
- PPP
- Legacy WAN.

ATM
- OC-3/STM-1, 155 Mb/s UTP
- DS-3/E3, DS-1/E1.

For more information visit our website: http://www.hp.com/go/internetadvisor

Add TIMS testing to HP Internet Advisor

The HP J2527A TIMS interface for the HP Internet Advisor gives basic analog tests to qualify circuits for voice, data, broadcasts and ISDN. HP J2527A operation is based on the HP TIMS product family: HP 4934A, 4935A and 4936A.

Attaching the HP J2527A TIMS interface to the HP J2300 Series Internet Advisor, combines analog tests with full decoding of LAN/WAN protocols, BER and transmission impairment measurements—all under one handle. The HP J2527A TIMS interface includes the following features:

- 50 Hz to 200 kHz operation
- Level/frequency
- Noise and noise-to-ground
- Noise-with-tone and signal-to-noise
- 3-level impulse noise
- P/AR
- IEEE 743 and ITU-T compliance
- Windows® user interface.

Datacom and LAN interconnection

(continued)

Telecom and datacom testing up to 2 Mb/s

For installation or maintainance of CEPT compatible datacom and telecom circuits and services, the HP 37732A provides datacom testing plus the full power of a HP 37722A Digital Telecom Analyzer (page 19). The rugged, field-portable analyzer consists of the HP 37722A and HP 15901A Option 001 datacom module.

The HP 37732A provides error performance testing at the four telecom interfaces and V.24, V.35, V.11/X.21-leased datacom interfaces at rates up to 2 Mb/s. It also gives a full range of BER/BLER measurements; control-circuit timing analysis; a built-in V.24 breakout box; and an internal synthesiser.

Simplified test setup reduces test times for faster problem resolution. Results are presented in easy-to-read and record ways, for pinpointing the cause of a problem. Use the built in RS-232-C port for printing results or for remote control in integrated systems. There's also the powerful HP E4540A Distributed Network Analyzer software for remote instrument control and results management. (see page 20)

T1 and datacom testing up to 1.5 Mb/s

The HP 37701B T1/Datacom Tester offers you a complete measurement solution for the installation and maintenance of T1, fractional T1 and datacom circuits and services in a single, portable box. In addition to the telecom measurements of the HP 37701B, you can add datacom capability to the tester by attaching the datacom module (HP 15901A Option 002). This module includes interfaces for RS-232-C, RS-449 and V.35 for rates up to 1.544 Mb/s, using its built-in synthesizer. An RS-232-C break-out box and control-circuit timing analysis help you identify interface faults.

T1, FT1, DDS and datacom testing in single, portable box

The HP 37702A Digital Data Tester provides measurements for the installation and maintenance of T1, fractional T1, dataphone digital service (DDS) and datacom circuits and services in a single, portable box. In addition to the standard telecom measurements of the HP 37702A, you can add datacom capability (described above) to the tester by attaching the lid module.

Wireline access networks

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
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Rugged, portable and easy to use TIMS

The HP 4934A TIMS is ideal for the installation and maintenance of special services which use a wide range of analog circuit types. It provides tests to qualify the local loop for DDS, basic rate ISDN and HDSL.

With one-button-per-function operation, the dedicated keys and indicators allow you to see the measurement setup at a glance. Measurements, using IEEE 743 methods, include:

- 20 Hz to 110 kHz operation (optionally 200 kHz)
- level and frequency
- noise and noise-to-ground
- noise-with-tone and S/N ratio
- 3-level impulse noise
- P/AR
- RS-232-C remote control
- Flash memory.

Measure to ITU-T Standards
The HP 4934A TIMS options J01 and J02 are for voice-frequency or wideband leased lines to ITU-T specifications. Select option J01 for countries with 820 Hz holding tone and Option J02 for countries with 1020 Hz holding tone.

Wide range of HDSL installation and maintenance tests

The HDSL Installer's Assistant offers a wide range of capabilities for HDSL circuit installation and maintenance including:

- HDSL plug-in card powering and verification
- Load coil detection
- Cable loss measurement
- noise and noise-to-ground
- T1 BERT.

The HDSL Installer's Assistant is a field-portable, rugged unit which accepts central office, doubler, and remote unit HDSL plug-in cards. The plug-in cards are powered from the built-in AC power supply; or they may be line powered. The unit can verify proper operation of the HDSL cards with each other. Easily accessible front-panel break jacks allow connection to the circuit. If the circuit does not come up properly with the plug-ins, the technician can access the cable pairs at any point in the span to sectionalize the problem to an individual part of the cable span.

After the pre-turn up tests are completed and the HDSL plug-ins are installed, the technician can use the built-in T1 BERT tester for final turn up and trouble shooting. Using a pair of HDSL Installer's Assistants, it's a simple matter to generate an end-to-end HDSL signal on the cable span.

Wireless access networks

GSM mobile and base station testing

The HP 8922S and 8922M are integrated test solutions for the production and servicing of GSM900 mobiles. Adding the HP 83220A/E expands the capability of the HP 8922 family to test DCS1800 and PCS1900 equipment. The HP 8922M/S measures the RF characteristics of mobile telephones with test of phase and frequency error, output RF spectrum, and transmit amplitude envelope. The HP 8922M is built for manufacturing, with accurate and repeatable measurements. The HP 8922S is tailored to the demanding needs of incoming inspection and mobile repair. Using the HP 83212C mobile station test software, the I-BASIC controller automates mobile incoming inspection and service.

DECT portable & fixed part test

The HP 8923B DECT Test Set delivers the key RF measurements required for Digital Enhanced Cordless Telecommunications equipment, plus the measurement accuracy required in R&D applications. The HP 8923B test set's measurements conform to ETSI CTR-06.

Test digital CDMA and analog mobile phones with one test set

The HP 8924C CDMA Mobile Station Test Set provides the measurements necessary to manufacture high-quality, dual-mode CDMA mobile telephones that comply with the TIA/EIA IS-95/95A and J-STD-008 air interface standard. Acting as a calibrated, high-performance CDMA base station, the HP 8924C provides high-accuracy measurements with the speed required for efficient manufacturing.

The HP 8924C now offers 14.4 kb/s data-rate test capability, J-STD-008 protocol support, and full control for testing of PCS mobile phones. Frequency coverage includes bands for US cellular and PCS units, Korean PCS units, and Japanese cellular phones.

The HP 8924C also includes full AMPS, NAMPS, and TACS analog phone test capability, so you save space and cost by making both analog cellular and CDMA digital cellular measurements with the same test set. The HP 83217 software automates AMPS, NAMPS, TACS/ETACS and CDMA testing for fast and repeatable measurement.

Test CDMA cellular and PCS base station

The HP 8935A CDMA Cellular/PCS Base Station Test Set is a full featured, one-box solution designed to meet the needs of installation teams, service providers, and network equipment manufacturers.

The HP 8935 utilizes a new larger, bright electro-luminescent display for easily read data. The HP 8935's new "rugged design" combines a membrane keypad, a gasketed display, stand up operation, filtered airflow and an enclosure to help protect itself from bumps and shocks.

The HP 8935 incorporates a user-friendly interface with Windows 95® type drop-down menus. Its faster measurement speed and *automated software* for Lucent, Nortel and Samsung PCS base stations, results in less base station off-line time and improved system performance. Additionally, HP 8935's firmware is user upgradeable so new features and capabilities can be added without returning the unit to a service center. The HP 8935 options include new PCS CDMA technician training.

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
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Analog and digital cell-site testing

Install and maintain AMPS, NAMPS, TACS, ETACS, and UTACS cell site radio equipment with the HP 8921A Cell Site Test Set and the HP 11807B software test packages.

The HP 8921A adds the HP 83204A to provide testing to TDMA (IS-136) base station equipment. This unit adds π/4DQPSK signal generation and analysis to the powerful analog features of the standard HP 8921A. HP 11807B cell site test software fully automates TDMA base station test procedures, reducing maintenance time.

Option 600 for the HP 8921A adds the HP 83205A for testing CDMA (IS-95A & IS-97) base station equipment. This system provides signal generation and analysis of QPSK/OQPSK signals. The system measures the power in each Walsh coded signal, the code channel timing, and the code channel phase relative to the pilot.

Portable GSM/DSC transmitter measurement systems

Use the HP 8590E Series Portable Spectrum Analyzers with either the HP 85715B GSM900, HP 85722B DCS1800, or HP 85722B option H19 PCS 1900 transmitter measurement personalities, to provide customized transmitter tests based on industry standards.

Features such as RF channel and timeslot selection, adaptive masks in time and frequency, simplify testing by providing one button measurements, ideal for R&D, manufacturing, or field applications.

Key measurements include:
Phase and frequency error, demodulated data bits, mean transmitted carrier power, power versus time, output RF spectrum, spurious emissions, intermodulation attenuation, combiner tuning.

CT2-CAI & DECT personalities
RF transmitter test of cordless telephones and bases is provided by the HP 85717A CT2-CAI measurement personality and the HP 85723A option H01 DECT transmitter measurement personality.

Signaling

Have confidence that your signaling system will operate properly after commissioning. With an HP test set, quickly identify those costly problems when they arise.

Simultaneous ISDN, SS7 and X.25 testing with variant customization

The HP PT500 Multiport Protocol Tester tests ISDN primary and basic rates, and looks at SS7 links simultaneously. Comprehensive emulation programs provide automated load-and-run tests. High-level decodes help you look for real problems instead of decoding.

Choose from a library of national and international variants for both ISDN and SS7. As you load a variant file, the user interface for the application program takes on the characteristics of that particular variant. You can modify the variant files easily to build your custom SS7 or ISDN test application.

Conformance testing standard
This conformance test tool is the standard for certification, acceptance, conformance, and regression testing. Automatic load and run suites are available for: X.25 (NET2, US GOSIP/ISO 8882, CTS-WAN), ISDN (ACT23, NET3, NET5, CTS2) and SS7 (Q.781).

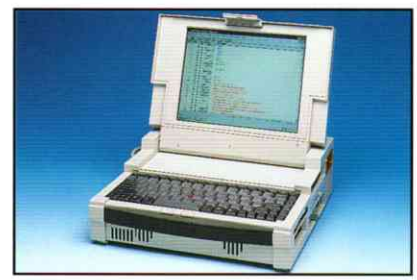
Rugged portable test set for network signaling

The HP 37900D Signaling Test Set makes it easy to investigate signaling system system No.7 interactions. The instrument troubleshoots signaling problems, ensure network conformance and compatibilty, and verifies SS7 and ISDN interactions.

The HP 37900D monitors up to four bidirectional signaling links simultaneously. When analyzing in service performance, the HP 37900D provides dedicated real-time measurements that follow signaling interactions as they happen. It also uses dedicated triggers, filters and traces to collect relevant test data. You can trace the messages associated with a telephone call simply by specifying the called party number.

SS7 signaling link performance is measured with a message statistics software package based on ITU-T recommendation Q.791.

For mobile applicants the HP 37900D decodes all parts of the GSM, PCN, IS41 MAP, TTC standards for JDC and NMT versions of the SS7 and ISDN protocols.



Monitor and emulate telecommunication signaling networks

The HP 37900E Signaling Test Set (available May 1998) is a rugged portable PC-based instrument providing monitor and emulation of SS7, ISDN, X.25 and V.5 protocols. It can handle up to 40 duplex protocol streams carried on one to 16 links. It tests telecommunications protocols particularly SS7 in both wireless and fixed/wireline networks, and can be used for emulating protocols as well as monitoring live traffic and deriving measurement statistics. Physical interfaces include E1, T1, V.35, DS0/DS0A and RS-232-C/449/X.21.

The HP 37900E synchronizes to the connected links automatically, and monitors the signaling traffic making it very simple to use. The user interface is graphical and based on MS Windows 95®.

Supported Protocols
ITU-T Blue/White Book, ANSI 92/Bellcore, CLASS 93, LIDB, #800, PVN, BT IUP94, PCS, GSM Phases 1, 2, 2+, Swiss variant, Chinese variant, Chile variant, ITU-T Q.921/931, V5.1/V5.2, X.25 (Levels 2 & 3), X.75, and many others.

B-ISDN and ATM networks

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
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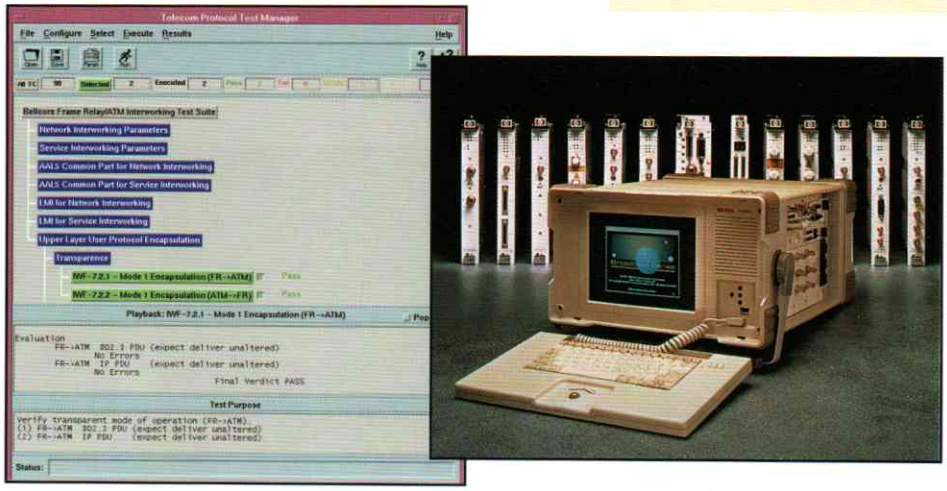
The test manager user interface that runs on the HP BSTS tester displays all relevant information about the test campaign at the top. The test suite browser displays a collapsible/expandable tree structure, further down, trace and test case purpose windows provide detailed data.


Telecom Protocol Test Manager
File Configure Select Execute Results Help
Bellcore Frame Relay/ATM Interworking Test Suite
Network Interworking Parameters
Service Interworking Parameters
AAL5 Common Part for Network Interworking
AAL5 Common Part for Service Interworking
LMI for Network Interworking
LMI for Service Interworking
Upper Layer User Protocol Encapsulation
Transparence
IWF-7.2.1 - Mode 1 Encapsulation (FR->ATM)
IWF-7.2.2 - Mode 1 Encapsulation (ATM->FR)
Playback: IWF-7.2.1 - Mode 1 Encapsulation (FR->ATM)
Evaluation
FR->ATM 802.3 PDU (expect deliver unaltered)
No Errors
FR->ATM IP PDU (expect deliver unaltered)
No Errors
Final Verdict PASS
Test Purpose
Verify transparent mode of operation (FR->ATM).
(1) FR->ATM 802.3 PDU (expect deliver unaltered)
(2) FR->ATM IP PDU (expect deliver unaltered)
Status:

The HP Broadband Series Test System

The HP E4200B/E4210B Broadband Series Test System (BSTS), a modular UNIX®-based industry-standard for ATM and BISDN testing, is specifically designed for R&D and quality assurance, type approval, and conformance testing of ATM, signaling, LAN interworking, WAN interworking and more. An extensive range of line interfaces let you test the physical, ATM convergence and application layers. Flexible architecture allows you to start with a basic, cost-effective configuration. X-windows networking also allows remote access testing. Emulation software provides reference protocol implementations. User programming provides scripting of automated test routines. The HP E4219A ATM Network Impairment Emulator tests your network's and devices' responses with real-world ATM impairments such as cell delay, cell loss, and cell error.

AAL-2 Support

In addition to AAL-1, AAL-3/4, AAL/5 and CLNAP, the E4212B supports AAL/2 for testing voice and wireless traffic over ATM using the mini cell embedded in AAL/2. The software also includes traffic generator with assorted traffic profiles.

OAM Protocols

Ensure proper implementation and functioning of the OAM protocol for performance monitoring, in-service fault detection. Fault localization features a 124-channel user-traffic generator with automatic OAM cell insertion and a real-time, 2-channel receiver for simultaneous VP/VC testing

ATM Signaling Stack

For evaluating and troubleshooting implementations against latest ATM Forum signaling standards, the BSTS software provides a comprehensive reference emulation for UNI and ILMI, plus a wide range of NNI and PNNI capabilities with automated conformance test suites to ensure correct implementation of the ATM Forum's signaling and address-registration specifications.

622 Mb/s ATM Transmission and Protocol Testing

The HP E1618A 622 Mb/s Optical Line Interface and the E1609A 0-622 Mb/s ATM Stream Processor provides the BSTS with higher layer and signaling test capabilities with OC-12c ATM generation and analysis, ATM and AAL5 traffic generation and analysis, and 622 Mb/s real-time statistics.

Frame Relay Interworking

BSTS modules are available for frame relay at T1/E1 and V-interfaces, while test software generates PVC-based test traffic with encoding and decoding of DL-CORE frames. Frame Relay SVC Protocol Viewer decodes signaling messages for SVC applications. Frame Relay over ATM Interworking Test Suites supply 94 automated test cases according to Bellcore's SR-9989 Test Plan.

For more information visit our website: http://www.hp.com./go/bsts

B-ISDN and ATM networks

(continued)

The HP E5200A Broadband Service Analyzer

The HP E5200A Broadband Service Analyzer is designed for the deployment and maintenance of the latest broadband equipment and services. Applications include characterization of end-to-end quality-of-service and rapid turn-up of both PVC and SVC ATM networks. It also minimizes troubleshooting time, and helps network operators meet service delivery requirements.

Features include:

- Dispatched and distributed ATM testing
- Comprehensive physical layer and ATM monitoring and simulation
- Interfaces from 1.5 Mb/s to 155 Mb/s
- Analyze LAN and WAN over ATM
- QoS and traffic performance tests.

The analyzer is compatible with the HP Broadband Series Test System, allowing easy exchange of data formats and scripts between lab and field people.

For the latest information, visit our web page at http://www.hp.com/go/atmanalyzer.

The HP Internet Advisor ATM

The HP Internet Advisor ATM is the complete ATM troubleshooting tool, offering statistical performance measurements, stimulus and response testing, and protocol decoding tools at all seven layers of the OSI stack. It offers bit error rate tests and optical power readings to ensure the integrity of physical media. From installation, maintenance and troubleshooting to performance optimization and remote monitoring, the HP Internet Advisor ATM lets you connect anywhere on the network, capture all the necessary data, and comprehend that information as it reveals problems and suggests solutions.

The monitoring and analysis capabilities for ATM are provided as a slide-in module or an undercradle for the HP Internet Advisor. This highly portable and economical package features a built-in, rugged personal computer with full keyboard, large display, pointing device, and Microsoft Windows95® user interface.

ATM testing with comprehensive transmission tests

HP 37717C with ATM

The HP 37717C Communications Performance Analyzer provides broadband testing from physical layer to service layers. It operates at all the most common ANSI and ETSI transmission rates. In-service ATM analysis features Channel View to find and identify up to 1023 active virtual channels displaying real-time cell rate/count simultaneously on all found channels. Check cell-delay variation in and out of service and analyze ITU-T O.191 ATM test cells.
(see page 19).

HP CERJAC 156MTS with ATM

With the ATM option, the modular HP CERJAC 156MTS can test ATM switches during installation and troubleshoot network problems. Features such as bandwidth utilization and auto scan for cell addresses allow users to verify switch configurations prior to service turn-up, and to diagnose customer problems when they occur. It also offers full SONET test capability for STS-1, OC-3, OC-3c, and OC-12.
(see page 15).

Digital transmission

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
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North American standards

Choose from a wide range of rugged, portable test sets offering high performance with many ease-of-use features for field maintenance. For the fast-changing world of synchronous networking, select products that combine PDH and SONET/SDH testing.

Portable test set for SONET and T-carrier testing, including ATM

The portable, lightweight HP CERJAC 156MTS SONET Maintenance Test Set combines digital transmission testing capabilities with SONET-specific tests to meet your SONET and T-carrier applications in the field. You can use the base unit for STS-1 testing with full receive/transmit functions and you can drop and insert DS3 payloads. OC-1, OC-3 and OC-12 interfaces, or DS3, DS1 and E1 ports, can be added as required. Intermediate and long-reach optical interfaces support 1310 or 1550 nm wavelengths.

Features include section, line and path error injection at user-selectable rates and SONET overhead control and monitoring. You can use the HP CERJAC 156MTS during SONET installation to test channel rates from DS0 to OC-12 with full demultiplexing of tributary signals. ATM is available for OC-3c and DS3 rates. Also, you can verify network synchronization and automatic protection switching.

Cost effective SONET testing

The field-portable CERJAC MTS LITE SONET Maintenance Test Set gives you fast, efficient SONET maintenance testing at rates up to 622 Mb/s STS-12. It gives comprehensive SONET overhead testing, having both generation and analysis of SONET signals at STS-1 and STS-3 (optional) electrical and OC-1/OC-3/OC-12 optical/interfaces. Also, DS3 and VT1.5 drop and insert plug-in modules are available.

With one keystroke, the MTS LITE configures itself to the received SONET signal and reports errors on its large graphic display and more than 30 SONET specific LEDs.

To help you quickly confirm the operation of network equipment alarms, each tester has a suite of automatic sequence of alarm stimulus response tests.

And you can add a range of errors to the SONET signals to fully exercise network equipment such as APS. There's full BIP error monitoring and payload pointer adjustment analysis, too.

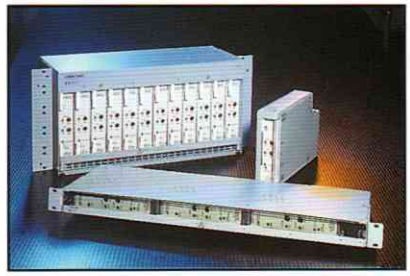
Digital transmission (continued)

North American standards

One-box, portable solution to SONET-OC-48 installation and maintenance

The HP 37778A OC-48/STM-16 Test Set is a field portable tester for installation and maintenance of SONET network equipment operating at 2.488 Gb/s (OC-48). It provides optical and electrical interfaces at 2.488 Gb/s and provides a payload drop and insert to a lower-rate SONET tester for detailed payload analysis. Measurement interfaces are provided as plug-in modules allowing flexible configuration. Both 1310 nm and 1550 nm optical interfaces are catered for, and the unit can also be configured as a portable jitter tester at OC-48.

The test set analyzes embedded SONET overhead bytes and can monitor live traffic non-intrusively for detection of alarms. With the HP 37778A, you can functionally test synchronous line multiplexers, line regenerators and digital crossconnects. Ensure the survivability of your network by stress testing all your network elements.



DS3 Network Interface Unit

The DS3 Network Interface Unit (NIU-3) is a remote testing and maintenance device that serves as a demarcation point between the network and customer premises equipment (CPE) for DS3 services.

The NIU-3 decreases installation and support costs by reducing the need to dispatch technicians to customer sites. By activating a Far-End Alarm and Control (FEAC) loopback between the NIU-3 and the Central Office (CO), a BERT can be performed to help determine whether the problem exists with the network or customer premises equipment.

In addition to the single-unit housing, the NIU-3 is available in 3-slot and 12-slot rackmount versions. The rackmount versions are ideal for sites with multiple DS3 services and for CO applications.

Due to its low cost, the NIU-3 can be deployed at each customer with DS3 services, thereby improving service uptime and customer satisfaction.

Field-portable DS3 and SONET electrical test set

The HP CERJAC 31XE is a complete DS3 test set that offers a wide range of optional features, from DS0 and E1 to SONET STS-1 testing: including receive and transmit capability. Options can extend the applications from the central office to field test and measurement. Features that make the transmission test set well suited to present and future telecom testing include:

- DS3, DS1, E1 and SONET STS-1 receive and transmit
- DS0 and E1 time slot drop and measurement
- jitter and signal measurement at DS3, DS1, STS-1 and E1.

DS3 testing in both directions simultaneously

The HP CERJAC 31D combines DS3 and DS1 transmission testing capabilities, with a standard dual DS3 receiver/transmitter, permitting simultaneous monitoring and out-of-service testing in both directions on a DS3 circuit. A range of options extends the test set's T-carrier capabilities from DS0 to DS3.

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
Visit our website: http://www.tmo.hp.com

Handheld solution for T1 test

The HP 37741A DS1 Tester gives you the power of a full-size T1 test set in the palm of your hand. It features single keystroke configuration and results reporting. With the 8 bicolor LEDs and large LCD display see the received signal's status in real time. Extensive T1 and FT1 signal generation and analysis, simplified line and path test, and addressable repeater control are included.

Whether you're measuring tariffed parameters or locating hard-to-find T1 faults, the HP 37741A gives you capability rarely found in such a small, handheld unit.

You'll find the tester really simple to use. The larger-than-average screen cleverly solves the problem of giving you rapid access to all test results. Add to this results printing and storage and long-life battery operation and you'll really appreciate the tester's capability.

T1 and FT1 testing with dual transmitter and receiver

All versions of the T1 Test Advisor provide users with capabilities for simultaneous control of two full-duplex drop-and-insert transmitters and receivers. The intuitive Windows® graphical user interface, combined with context-sensitive help and on-line manuals, makes this product extremely easy to use. Optional plug-in modules provide support for datacom testing while also providing an easy method of extension.

Upgrades are accomplished either by a disk containing new software and firmware, or over a dial-up telephone line. Results and set-ups can be stored to disk for later analysis. SLC-96 testing makes full use of graphics to ensure easy hook-up and testing.

The T1 Test Advisor supports full and fractional T1 testing and comes standard with two transmitters and two receivers. This test functionality is available in a number of physical packages. For T1 standards (ANSI), these products are the HP E4594A, E6325A, E6327A, and E6334A.

T1 and datacom testing up to 1.5 Mb/s

The HP 37701B T1/Datacom Tester offers you a complete measurement solution for the installation and maintenance of T1, fractional T1 and datacom circuits and services in a single, portable box. In addition to the telecom measurements of the HP 37701B, you can add datacom capability to the tester by attaching the lid module. This datacom module includes interfaces for RS-232-C, RS-449 and V.35 for rates up to 1.544 Mb/s, using its built-in synthesizer.

T1, FT1, DDS and datacom testing in single, portable box

The HP 37702A Digital Data Tester provides measurements for the installation and maintenance of T1, fractional T1, dataphone digital service (DDS) and datacom circuits and services in a single, portable box. In addition to the standard telecom measurements of the HP 37702A, you can add datacom capability (described above) to the tester by attaching the lid module.

Digital transmission

International standards – CEPT

Handheld solution for 2 Mb/s testing

The HP 37742A 2M Test Set gives you the power of a full-size tester in the palm of your hand. It offers you extensive framed and unframed signal generation and analysis. You can identify problems on shared circuits using n x 64 kb/s or test PCM 30/31 circuits, with or without CRC-4 framing.

You'll be impressed with the powerful performance you have at your fingertips. Whether you're measuring tariffed parameters, or locating hard-to-find 2 Mb/s line faults, the HP 37742A gives you capability rarely found in such a small handheld unit.

Along with all the test signals that a technician needs for 2 Mb/s testing, there are time-saving simultaneous measurements and easy-to-read alarm and error LEDs to help you quickly spot circuit problems. Add to this printing and storage of results, and long-life battery operation, and you'll really appreciate the tester's capability.

E1 and Fractional E1 testing with dual transmitter and receiver

The Internet Advisor family offers integrated LAN, WAN and internetwork monitoring and analysis capabilities under one handle.

The HP E6323A E1 Telco Undercradle adds to this combination unsurpassed physical layer testing: extensive expertise in full and fractional 2 Mb/s testing, and the ease-of-use of the Windows® graphical user interface. The E1 Telco Undercradle attaches to the Internet Advisor in a matter of seconds.

Optional plug-in modules protect investment, while new software features are easily loaded using floppy disks or via dial-up telephone lines. Test results and set-up information can be stored to floppy disk for future analysis. The event log enables the user to select a mix of events that will be time stamped and stored—up to a total of 3300 events. This log can be printed or exported as a file for inclusion in a more comprehensive document.

Any existing notebook, PC 386 or better, can be used with the HP E6349A E1 Test Advisor—standalone configuration. Test functionality of the E6323A and E6349A is identical. With addition of a modem connected to the serial port of the E6349A E1 Test Advisor, it becomes an ideal "drop-box" that can be left at remote sites for long-term monitoring, continually gathering data about circuit performance. To get test results remotely, the test engineer simply calls the E6349A using a dial-up modem connection.

All versions of the E1 Test Advisor include error analysis to G.821 M.2100, M.2110, and M.2120. The dual-port testers simultaneously control two full-duplex drop-and-insert transmitters and receivers, and make full use of on-screen graphics to help insure easy hook-up and testing. Graphic representation of channel status, and the ability to drop both sides of the circuit to an internal speaker, makes channel test easier that ever.

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
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Telecom testing at 64, 704, 2048 and 8448 kb/s

The HP 37722A Digital Telecom Analyzer offers installation and maintenance, in-service and out-of-service, BER and signal measurements on CEPT digital circuits, in a portable, rugged package. M.2100 measurements are standard (M.2110/M.2120 optional), as is high resolution round trip delay.

The large, clear display shows only what you need. Softkeys make the HP 37722A very easy to use. Auto setup and trouble scan features simplify testing.

For installation and troubleshooting, the analyzer has framed pattern generation and measurements at 704 kb/s and 2 Mb/s (standard and CRC-4) and n x 64 kb/s testing. Options add framed/unframed 704 kb/s and 8 Mb/s, n x 64kb/s timeslot access, sub-64 kb/s testing, slips/wander, and tone generation and measurement

The HP 37722A is easily upgraded to the HP 37732A telecom/datacom analyzer (page 8).

One box, portable solution for PDH/SDH systems up to STM-16

The HP 37717B/C family of Communications Performance Analyzers offer one box, field portable testers for installation, and maintenance of hybrid PDH/SDH and ATM transport networks at rates from STM-4 (622 Mb/s) through STM-1 (155 Mb/s) to STM-0 (52 Mb/s). Optical 1310 nm and 1550 nm interfaces are supported as well as electrical interfaces at all rates, including PDH from 140 Mb/s to 704 kb/s. Modular architecture, allows flexible configurations and upgradeability – thus protecting investment.

The instrument can test simultaneously PDH, SDH, ATM and jitter or can be configured for PDH only, SDH only or ATM only with or without jitter generation and measurement. The HP 37717B provides a budget solution. The more powerful HP 37717C has a color display and optional graphics printer.

The HP 37717C performs in-service monitoring of live traffic, performs out-of-service BER measurements or fully tests ATM physical and cell layers and B-ISDN protocol stack. Stress network elements by performing frequency offset, and automatic jitter measurements to the latest ITU-T recommendations. Protection switch times, frequency, delay and optical power measurements are also supported.

Multirate tester to STM-16
The HP 37717C fitted with 2.5 Gb/s options (available Summer 1998) provides all the interfaces under one handle from STM-16 to STM-0 and PDH rates from 140 Mb/s, and down to 2 Mb/s. As this new capability resides in the HP 37717C mainframe, user interface and test features are the same thus avoiding costly staff retraining.

Featuring STM-16c and STM-4c concatenated payloads, protection switching tests, mixed payloads comprehensive overhead access, pointer processing plus optional multirate jitter generation and measurement, it provides all necessary tests for evaluating the latest SDH/PDH networks. Multirate optical interfaces include 1310 nm, 1550 nm and dual (combined 1310/1550 nm) wavelengths.

Digital transmission (continued)

International standards – CEPT

Combined 140 Mb/s BER and frame analysis

The HP 37721A Digital Transmission Analyzer simplifies test setup, and provides superior results display and analysis. It covers all your in-service and out-of-service test needs at 704 kb/s, and 2, 8, 34 and 140 Mb/s.

With auto setup, the analyzer rapidly self aligns to the incoming signal level and code; also to the bit rate, test pattern, and interface. Alternatively, choose any one of nine user-defined sets of test parameters.

To trace faults on live circuits quickly, just hook up to a protected monitor point and check for code errors. Perform quick, in-service frame-error analysis; checking multiframe alarms, and counting frame-bit, CRC-4, and remote-end errors.

Accurately determine your out-of-service network performance at 704 kb/s, and 2, 8, 34 and 140 Mb/s to ITU-T G.821. Apply up to 100 ppm offset to standard bit rates, or check that the received frequency offset is within ITU-T limits.

One box, portable solution to STM-16 and STM-1 installation test

The HP 37778A SDH STM-16 Test Set is a field portable test set for installation and maintenance of SDH network equipment operating at 2.488 Gb/s (STM-16). It provides electrical interfaces at 155 Mb/s (STM-1) along with electrical and optical interfaces at 2.488 Gb/s (STM-16). Measurement interfaces are provided as plug-in modules allowing flexible configurations: test 1310 nm or 1550 nm, add 2.488 Gb/s thru-jitter and measurement.

Analyze embedded SDH overhead bytes and perform multiplexer tributary/line testing at STM-1/16 with mapped 2 Mb/s, 34 Mb/s and 140 Mb/s payloads. Perform non-intrusive monitoring of live traffic and detect alarms simultaneously at the STM-1 and STM-16 level.

With the HP 37778A you can functionally test synchronous line multiplexers, line regenerator and digital cross-connects. Ensure the survivability of your network by stress testing all your network elements.

Low cost distributed network analysis

Create a low cost network analysis system to reliably gather information about network performance. The HP E4540A Distributed Network Analyzer software, controls HP's range of HP 37xxx PDH, SDH and ATM test sets. With this PC based software: control one instrument (at a local or remote site) or a number of instruments in a multisite system.

The HP E4540A analyzer software is Windows® based, operating on a PC or laptop and connects to the remote site via Hayes® compatible modems or LAN interface if fitted to instrument.

Key features are robust automatic results retrieval; transfer of results into Windows® applications for analysis, or to produce graphs and reports; simplified testing using stored test sequences and configurations; and a virtual instrument display that allows a technical expert at a central site, to support technicians troubleshooting at remote sites.

Microwave transmission

How do you know if your satellite or microwave radio transmission system is operating within specification, or if it will survive those really difficult propagation conditions? With this range of HP test equipment, you can be sure your transmission system's defences are ready.

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
Visit our website: http://www.tmo.hp.com

Comprehensive radio testing out at the tower

The HP 11758V Digital Radio Test System, combines all the tests required during installation and maintenance test of a digital radio in two portable cases weighing under 30 kg (70 Ib). The HP 11758V offer the following measurements.

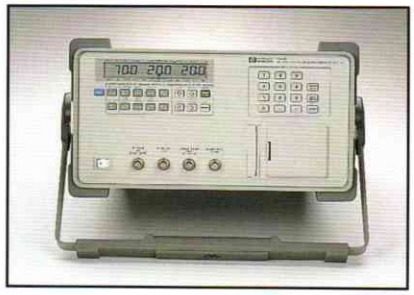
- spectrum analysis at IF and RF (to 22/26.5 GHz)
- group delay and amplitude flatness (with Option 201)
- power to 26.5 GHz
- frequency to 22/26.5 GHz
- IF and RF flatness to 24 GHz
- multipath fading analysis
- intermodulation distortion
- Diversity Antenna Delay Equalization (DADE)
- Return loss.

Microwave transmission test personalities for portable spectrum analyzers

The HP 11770A Link Measurements personality adds group delay and amplitude flatness measurements to an HP 8590E Series Spectrum Analyzers. In many installation and maintenance test applications, the portability of test equipment is an essential requirement. Space being at a premium in satelite earth stations and microwave repeater stations.

By combining the HP 11770A, the HP 85713A digital radio personality and HP 8590E series spectrum analyzer a powerful, portable, installation and maintenance tool is created which is capable of performing the following tests.

- Group delay and amplitude flatness
- IF & RF carrier power
- IF & RF carrier frequency
- Spectral occupancy
- Intermodulation product measurement
- Spurious emissions
- DADE measurements
- Return loss measurements.



Stress test your radio in time for signal fading season

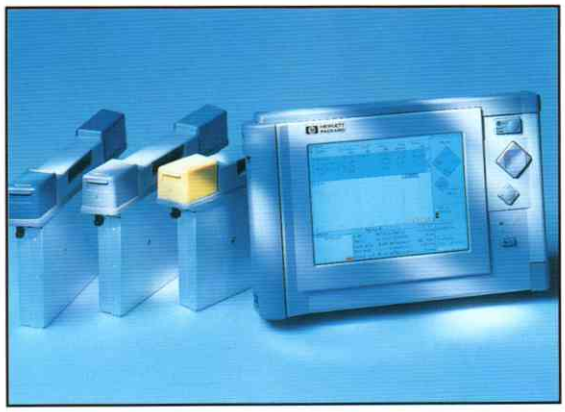
Confidence in your microwave radio uptime, depends on knowing the equalizers and other protective circuitry will operate correctly, as the signal path conditions create multipath fading impairments.

The HP 11757B Multipath Fading Simulator realistically simulates natural path fading, to allow your preventative maintenance technician to stress test the protection circuits in the field site.

By printing out a permanent record of the radio's M-curve signature, at installation time, and comparing it periodically during future visits to the tower, your confidence in the radio's ability to withstand serious path impairments is dramatically increased.

Lightwave transmision

HP offers you a variety of test solutions for installation and maintenance of fiber optic cables and links, including WDM systems.



A complete optical fiber test set in one instrument

The HP E6000A Mini-OTDR maximizes your network uptime by locating and characterizing faults quickly and accurately. The unrivalled combination of 16000 data points and a minimum sample spacing of 8 cm allows the powerful analysis algorithm to determine the exact location and characteristic of an event. Add to this the 20 m attenuation deadzone, and you really can measure and resolve closely-spaced events along the whole fiber link.

Its one-button operation and its user interface, makes it easy even for those with minimal training to quickly make advanced, reliable OTDR measurements. The HP E6000A, however, goes beyond a Mini-OTDR. Its fiber break locator mode looks exclusively for breaks, and these are then quickly displayed. The real-time mode gives you instant feedback on parameter changes you make, so that the optimal setup can be found quickly.

At less than 2.8 kg (6.2 lbs), the HP E6000A, with its rugged design, means that it is ideal to be carried even into those inaccessible places. Containing the most advanced smart battery technology, you never need be caught without power. The battery delivers exact information on the charge status – with an accurate on-screen "fuel gauge". A full recharge takes less than three hours.

Additional capabilities include Multimode Modules, the Optical Power Meter Sub-Module and Visual Fault Finder Sub-Module which simply plug into the existing instrument.

All the HP OTDR modules act as powerful, stabilized continuous wave (CW) light sources, and with the Power Meter Sub-Module in place, you're able to perform loss and power measurements. There's no need to switch instruments for multimode or single-mode measurements; with the HP Mini-OTDR, you have a complete optical fiber test set in one instrument!

Cost-effective performance in a compact package

The HP 8147 is a high performance optical time domain reflectometer for installation, commissioning and bench applications. It is designed for fast and accurate measurement and analysis of a fiber link, all at the touch of a single button.

"Easy Mode" lets you pre-program complete procedures. So, with a couple of keystrokes, you get standardized repeatable measurements every time.

Extended in-depth analysis includes two-way measurements, delta measurements and comparison of up to four traces. A return loss graph shows the reflectance of individual events and the total return loss of the link.

The HP 8147 remote capability allows centralized operation, collection and analysis of results from remotely-stationed OTDRs. (see also page 29).

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
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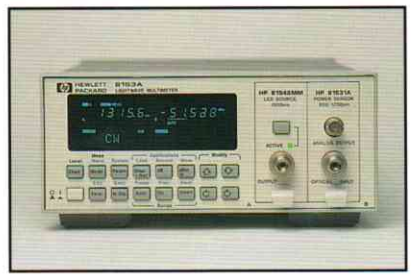
Quick and easy characterization of a WDM system in the field

Systems using wavelength-division multiplexing (WDM) techniques can increase a link's signal capacity four, eight, sixteen or more times. These corresponding signals are sent down the link with each having their own unique wavelength and power. A demultiplexer at the receiving end then separates and directs the signals to individual receivers. In order to maintain the overall system performance, it is important for each signal to stay within its wavelength, power and signal-to-noise ratio specifications.

The HP 86120B Multi-wavelength Meter allows technicians to quickly verify these parameters for up to 100 channels in the 1310 nm, 1550 nm, or both optical windows.

At about one-half the price of a traditional optical spectrum analyzer and with very high tolerance to shock and vibration, the HP 86120B multi-wavelength meter is the ideal tool to complement the power meters and loss test sets typically used during installation and maintenance of fiber optic transmission systems.



Precision measurement of all basic fiber optic parameters through all common connector types.

You can operate the HP 8153A Lightwave Multimeter as an optical power meter, dedicated loss test set, return loss meter or stabilized light source – replacing a number of standalone instruments. Its high precision makes it ideal for final link loss and power budget measurements.

Optical attenuator for high return loss applications

With return loss options from 35 dB to 60 dB, the HP 8156A Optical Attenuator is ideal for use in the field to determine optical power margins or acceptable signal to noise/ distortion ratios in CATV systems.

High resolution measurement of dense WDM transmission systems

The HP 8168E and the HP 8168F Tunable Lasers enable the wavelength-resolved testing of dense WDM links, providing up to +7 dBm output power combined with up to ±1 pm wavelength linearity.

Test solutions for installation and maintenance of fiber optic cables and links

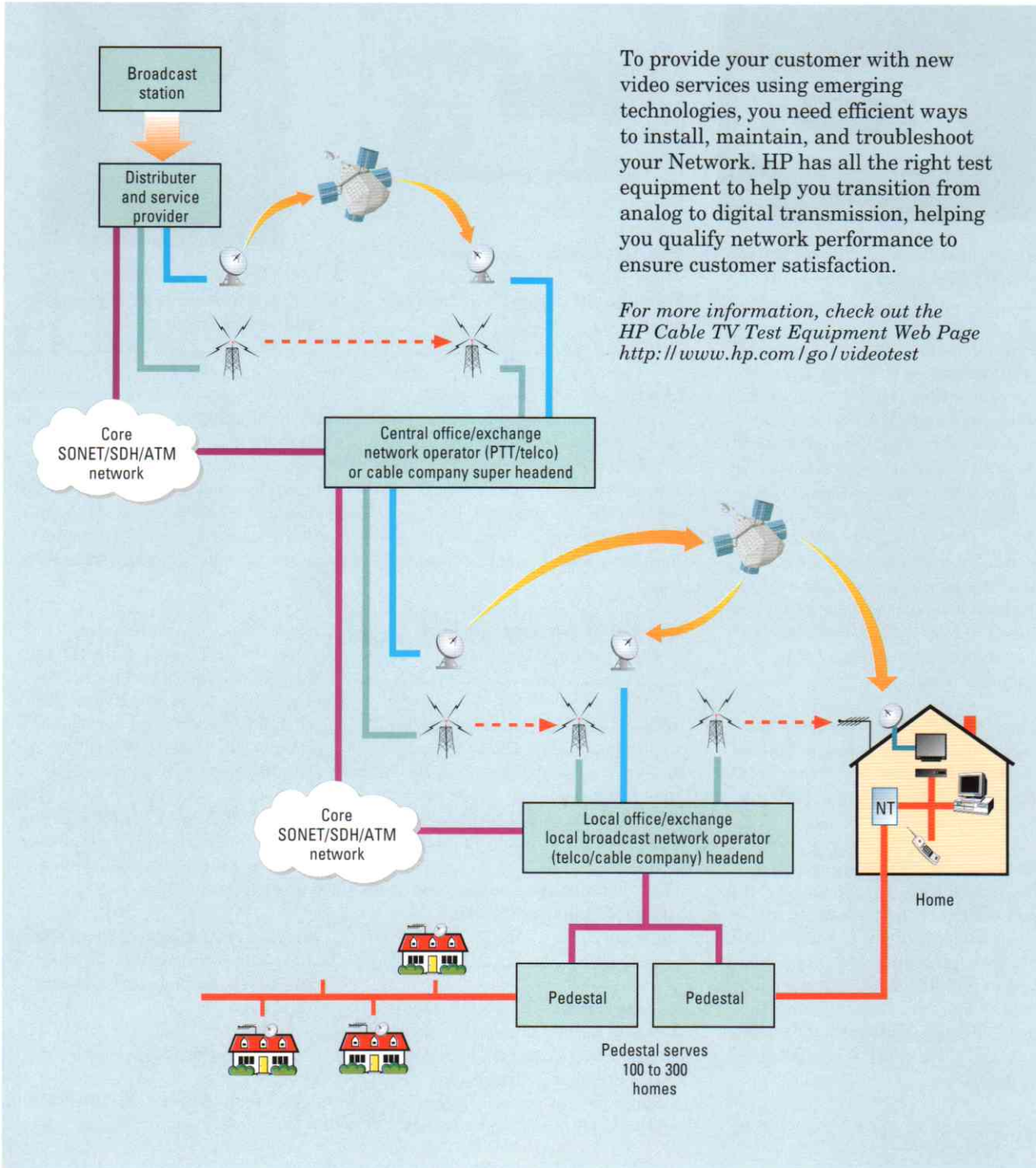
The three instruments comprising the handheld fiber optic test family combine high performance with ease-of-use and long battery operation. They include loss test set and absolute power measurement, fiber identification by modulation and dual wavelength testing from one port.

The HP E5970A is an optical power meter suitable for 9/125 µm single-mode fibers and for multimode fibers up to 50/125 µm. The HP E5972A LED light source has an emission wavelength of 1300 nm for multimode applications up to 100/140 mm. The HP E5974A 1310/1550 nm dual laser source provides –7 dBm output power, high power stability, internal modulation and wavelength encoding.

All three instruments have exchangeable connector interfaces, including bare fibers, for the most common standards.

For more information visit our website:
http://www.hp.com/go/lightwave

Video Networks



To provide your customer with new video services using emerging technologies, you need efficient ways to install, maintain, and troubleshoot your Network. HP has all the right test equipment to help you transition from analog to digital transmission, helping you qualify network performance to ensure customer satisfaction.

For more information, check out the HP Cable TV Test Equipment Web Page http://www.hp.com/go/videotest

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
Visit our website: http://www.tmo.hp.com

HP MPEGscope ATM Test Application for the BSTS

The HP E6271A MPEGscope ATM Test Application for the Broadband Series Test System adds real-time MPEG-2 testing to the industry's most comprehensive ATM test system. (see page 18).

Test MPEG-2 transport streams over standard ATM interfaces from 1.5 Mb/s to 155 Mb/s. With other BSTS features such as the HP E4219A ATM Network Impairment Emulator Module visualize the effects of ATM impairments on the MPEG-2 transport stream. With the HP E4226B MPEG-2 Protocol Viewer Test Software do protocol testing of MPEG-2 transport streams over interleaved and non-interleaved AAL-1 and over AAL-5.

Features include:

- PCR jitters and interval analysis
- PID bandwidth and utilization measurements
- PSI table analysis and decoding
- Transport stream error indication
- Trigger on thresholds, errors, or pattern matches
- Full MPEG-2 protocol analysis
- Off-line video decoding/analysis.

Real-time digital video test platform

The HP E6277A MPEGscope Plus tests DVB/MPEG-2 systems. You can analyze, troubleshoot, or stress test digital video payloads and digital video systems in development, evaluation, or operation.

Features include:

- Real-time ETR-290 error checks
- PCR jitter, PID bandwidth and T-STD monitor
- Real-time hierarchical PSI table display and decode
- Record or stream at 60 Mb/s to a 9 GByte disk (standard NT files)
- PSI/SI tables display using service and event information for easy and intuitive navigation
- Protocol analysis of TS packets. PES packets and PSI/SI tables
- Video elementary stream analysis
- Standard compliance test option (850 fully automated tests).

Optional software is available such as the MPEG Video Elementary Stream Compression Analyzer or the DVB/MPEG Compliance Verification Test Suite.

For more information visit our website:http://www.hp.com/go/MPEGtest

Ideal for field testing of DVB-C signals and complete spectrum analysis of your cable TV Systems

Cable TV network operators planning the introduction of DVB-C (Digital Video Broadcast via Cable) services, require test equipment capable of verifying quality of service fast.
The HP 8594Q QAM Analyzer is a comprehensive test solution for European DVB-C systems. Supporting 8, 4 and 2 MHz channel bandwidths, the HP 8594Q makes both qualitative and quantitative measurements on the transmitted 64 QAM signal, provides comprehensive spectrum analysis, and verifies the quality of service delivered to subscribers. All measurements are presented in a user friendly manner so that the engineer can focus on the job at hand, not on operating the test equipment.

As well as RF and modulation analysis, the HP 8594Q option 195, Data Measurements, provides both true and Reed-Soloman Bit Error Ratio measurements, and the capability to display the Program Identifier (PID) information contoured within a MPEG transport stream.

For more information visit our website:http://www.hp.com/go/CATV

Video Networks

(continued)

Testing to the ATSC digital TV transmission standard

Designed for testing 8VSB & DVB-C television transmissions, the HP 89441V VSB/QAM Signal Analyzer offers comprehensive RF and modulation test capabilities.

TV broadcasters can be sure of precise transmission power level measurements and accurate statistical measurements of peak-to-average power.

Designers of television systems can quickly identify errors in their designs with the HP 89441V's signal quality measurements and visual display of VSB constellation and eye diagrams.

A built-in adaptive equalizer helps identify linear distortions in the transmission channel and the strength and position of multipath reflections. The HP 89441V also gives users spectrum analyzer functionality for measurements of pilot level and pilot frequency. It provides pre-defined user setups for 8/16 VSB, 16 through 64 QAM for the DVB-C standard and 256 QAM.

Generate complex I/Q modulation over wide bandwidth

The HP ESG Series of Signal Generators provide precise frequency and level control, excellent in-channel performance and versatile modulation, ideally suited for receiver test, component test and local oscillator applications.

The analog I/Q inputs can be used to generate the complex modulation formats, required for development and testing of many RF digital systems. An internally calibrated quadrature modulator processes the I/Q input signals, to provide superior modulation accuracy and stability, over a 10 MHz (1dB) bandwidth.

Key ESG Series features:

- Expandable architecture upgrade paths for options and digital modulation
- Choice of frequency coverage 1, 2, 3, or 4 GHz
- Optional built-in digital modulation formats for GSM, NADC, PDC, PHS, DECT, and TETRA
- Wideband FM and phase modulation
- Built-in function generator.

Flexible, DVB-C compliant test source for testing set-top boxes, devices or networks.

In conjunction with an HP ESG Series digital signal generator, the HP E4441A DVB QAM Coder produces DVB-C compliant test signals, with programmable impairments, for true bit error rate measurements.

Both test and real world signals can be generated, by modulating either internally generated MPEG-2 null packets or an external MPEG-2 transport stream onto IF/RF in real time.

The DVB QAM coder and HP ESG digital signal generator combination provides a precision reference signal suitable for both laboratory and manufacturing test. To simulate poor signal conditions, the DVB QAM coder produces a range of signal impairments to test the limits of receiver design or network performance.

An intuitive Windows®-based graphical user interface allows coding, constellation size, symbol mapping and filter characteristics to be changed easily and quickly.

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
Visit our website: http://www.tmo.hp.com

Dedicated analog cable TV measurements and complete spectrum analysis for in-service RF and Video testing

The HP CaLan 8591C Cable TV Analyzer gives you dedicated analog cable TV measurements and complete spectrum analysis for system installation and troubleshooting. The analyzer also makes non-interfering in-service analog RF and video tests to verify system performance. The analyzer has a 75-ohm input with a 1 MHz to 1.8 GHz frequency range, internal measurement storage and report generation capability. Cable TV data management software (option 30, NTSC only) lets you download test data to a PC for archival storage and creating FCC reports.

The cable TV analyzer is the industry's most complete single box tester for analog RF and video compliance and proof of performance testing to international standards. Most tests require only a single key stroke to get results quickly.

The HP CaLan 8591C cable TV analyzer now comes with digital video power measurement.

The most comprehensive tool for return path activation, maintenance and ingress management

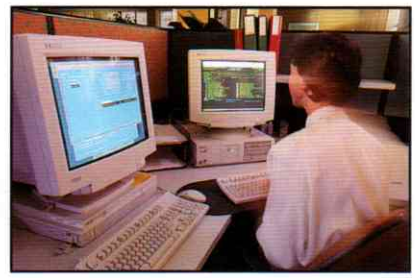
HP Calan's sweep/ingress analyzer checks that your broadband system is operating reliably and that you're delivering quality, distortion-free signals to your subscribers.
This solution consists of a portable field unit (HP Calan 3010R) and a rack-mount headend unit (HP Calan 3010H). When ingress corrupts reverse path communication, the 3010H instantly senses the problem and transmits a display of the ingress to the 3010R in the field for immediate trouble-shooting.

Dual path sweep includes a sweep transmitter and uses a single, agile pilot for both forward and reverse paths, making the most efficient use of system bandwidth. HP's fast DigiSweep technology ensures that you will quickly be able to align the system without interference.

Data Management Software
Save time by automating the transfer, analysis, reporting, and long-term storage of your measurement data with our data cable TV data management software. This software, provides direct PC transfer of data from the HP Calan 3010 family.

Network management systems

HP offers open computer systems based on industry standards that can help you introduce new, profitable services and implement versatile, network-management systems.



HP acceSS7 network monitoring system

Turn your SS7 data into cash
Signaling System No.7 plays a critical role in the success of your business. As more and more of your revenues are derived from SS7-based intelligent network applications and services, the quality, performance and reliability of your SS7 network becomes even more vital. Now you can harness the power of your SS7 data and turn it into a valuable asset.

HP acceSS7 is a powerful network-wide monitoring system which collects and analyzes SS7 data in real time. Its modular architecture supports a comprehensive range of applications from Hewlett-Packard and third parties. Using HP acceSS7 you can increase your revenues and decrease your operating costs.

The system uses probes located at remote sites to non-intrusively gather and process real-time data from signaling links. The processed data is transmitted over a dedicated wide area network to a central site processor, where the network wide activity can be correlated and analyzed. The system is independent of the network elements and continues to operate during fault conditions. The system can be deployed in wired networks and wireless networks (GSM and IS-41).

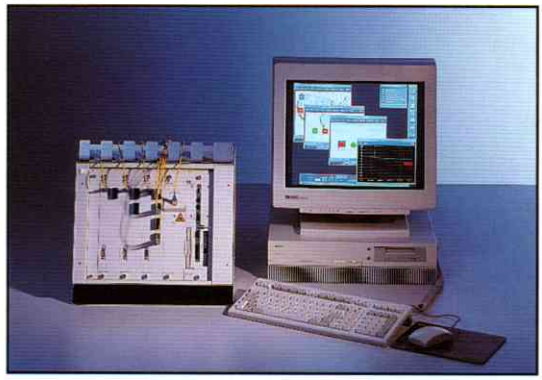
Early warning of revenue threatening conditions and network-wide troubleshooting
To be successful, you need to be able to identify and resolve SS7 network problems quickly, before your customers' quality of service is affected. HP acceSS7 monitors SS7 traffic in real-time, giving you early warning of potential problems so you can take a proactive approach to maintenance. When a problem occurs, HP acceSS7 has the flexible, network-wide troubleshooting tools that give you the power to resolve even the most complex SS7 faults.

Detect fraud as it happens
Telephone fraud is an estimated $12 billion problem world-wide for the telecoms industry, stealing revenue, creating administrative overheads and destroying customer confidence. The HP acceSS7 fraud management toolkit minimizes losses by detecting fraud as it happens allowing you to disconnect fraudulent connections or activities fast. By adding new modules as different types of fraud emerge, you can stay one step ahead.

Accurate billing for network usage
In order to survive in an increasingly competitive market, you need to be able to bill other operators for the use of your trunk or SS7 network, and verify your bills from other operators. And as you develop new services, you need a way to bill your customers according to usage. With HP acceSS7 you can gather real-time data for your billing systems and verify inter-operator charges.

Capture the marketing advantage
Your SS7 network contains a wealth of information. Data gathered by HP acceSS7 can be analyzed, giving you valuable information about how your customers are using your network and services. With this vital information, you can offer your key customers additional benefits. services and support tailored to their exact needs.

For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
Visit our website: http://www.tmo.hp.com



Remote fiber testing systems improve network quality

Remote fiber test systems improve network quality as they check fiber links automatically on a regular basis. Information is stored centrally, allowing link degradations to be identified and located quickly to minimize downtime.

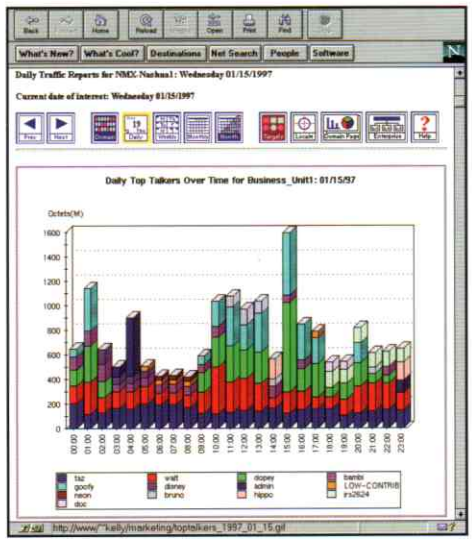
The HP 81700 Series 200 is a modular, distributed system that takes advantage of open communication protocols to integrate easily into telecom networks. The system consists of processor, measurement and communications hardware, along with the operating and application software. It can be tailored to suit all requirements, from a single site standalone system to a multiple remote site system which is fully integrated into a telecom network management strategy such as the ITU-T Telecommunications Management Network Environment.

The system uses remote units to collect and analyze OTDR measurements of optical fibers for various wavelengths (1310 nm, 1550 nm and 1625 nm) and dynamic ranges (up to 42 dB). These signatures are then compared with stored reference measurements to determine if any changes can be detected. This ongoing process of measurement and comparison produces a comprehensive view of the status of the optical fiber network. Significant changes or failures are reported to the central manager. User-definable alarm thresholds ensure that any gradual deterioration of fiber performance is reported before a breakdown of service occurs.

A "manager" takes command of the entire remote testing configuration and can interface with the operations support system of the network. The manager performs functions including network display, trouble ticketing, fast alarming, geographic reference to events on the cable route and storing network maps.

Network management systems

(continued)



Distributed Monitoring and Analysis Systems for LAN and WAN

HP NetMetrix provides management applications to address LAN and WAN data communication infrastructures. Scaleable architecture combines the best of two management approaches: to distribute and correlate network information within partitioned management domains, and to consolidate and present information from those domains at a central site.

Features include:

- capabilities to identify and isolate data communication problems across your internetwork
- consolidated enterprise accessibility through single-interface LAN/WAN integration
- detection and reporting on availability and responsiveness of mission-critical computing resources
- identification of activity on secure networked corporate resources
- automated and web-based reporting that simplify the interpretation of consolidated data.

Data collectors distributed throughout the internetwork collect network statistics for centralized HP NetMetrix applications to access, interpret, correlate, present, and report.

NetMetrix LanProbes are RISC-based, SNMP-managed RMON and RMON2-based data collectors distributed on LAN segments of an internetwork. LanProbes are available for ethernet, fast ethernet, token ring, and FDDI. The Quad Ethernet LanProbe addresses switched LAN and other multisegment monitoring applications, offering up to four telemetry ports. LanProbes are managed by any SNMP/RMON-compliant network management application, including NetMetrix/UX for HP and Sun. HP WanProbes monitor WAN access links for frame relay, X.25, HDLC (PPP), and Internet services. WanProbes are managed by the NetMetrix Distributed WAN Monitoring application and by HP NetMetrix/UX.

Automated RF Coverage Measurement of PCS and Cellular CDMA networks

Your wireless communications network represents a major investment. To see a return as soon as possible, you need to complete the turn-up phase quickly. Fast turn-up of your network requires efficient optimization of RF coverage. The HP E7450A combines the HP E6450A digital PCS receiver and powerful Windows 95® based (WindowsNT® compatible) software to make automatic RF coverage measurements that are network-independent, fast, accurate and repeatable. You'll spend less time driving the network to achieve optimization. After your network is turned up, the HP E7450A helps you maintain customer satisfaction by keeping the RF performance of your network at the highest possible level.

The HP E6450A receiver was designed to withstand vibration, mechanical shock, and extremes of temperature and humidity, so you can count on minimal down-time even in the harsh field-testing environment.

Telecom manufacturing test

As well as products for field maintenance of your telecom network, HP offers many instruments for the R&D and production testing needs of network equipment manufacturers. Here are just a few examples from the HP range covered in the Test & Measurement Catalog.

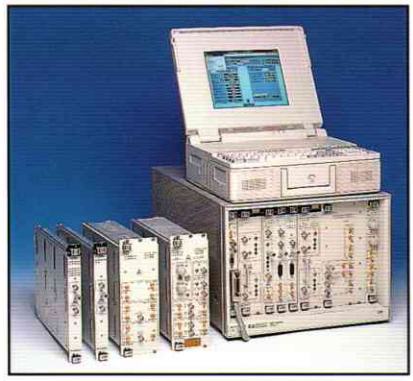
For more information, ask for HP's complete Test & Measurement Catalog or individual product data sheets. (See back cover.)
Visit our website: http://www.tmo.hp.com

High-speed digital test up to 12 Gb/s

The HP 71612A Series of Pattern Generators, Error Detectors and Error Performance Analyzers addresses digital test up to 12 Gb/s, including R&D and manufacturing test of lightwave components and sub-assemblies; advanced computer technology and high-capacity communications systems.

The HP 71612A operates from 1 to 12 Gb/s (optionally down to 100 Mb/s). Features include high-quality waveforms, versatile triggering, 8 Mbit pattern memory, and error location analysis. PC-based applications software is available for functional test of OC-192 and STM-64 equipment (HP E4544A) and for Q-factor eye analysis (HP E4543A).

For lower rate transmission systems, such as datacoms and CATV trunk feeds, the HP 71603B 3 and 1.5 Gb/s error performance analyzers, provide a range of PRBS and user-defined patterns, with versatile triggering facilities.



Powerful, modular analyzer for SONET/SDH and WDM testing

The HP 75000 Series 90 Modular SONET/SDH Analyzer has the adaptability and versatility to meet the new and evolving worldwide standards.

It operates at all hierarchical levels to 2.488 Gb/s (STS-1, 3, 12, 48, and STM-1, 4, 16). The analyzer performs real-time generation and analysis of both SONET and SDH formatted signals with comprehensive jitter testing. It can test a wide range of network elements – including add-drop multiplexers, line terminal multiplexers, digital cross-connects and regenerators.

The Series 90 can now be configured for WDM system test. With multiple optical STM-16/OC-48 transmitters set at appropriate wavelengths combined with receivers and optical switches, the system provides a flexible and scalable test configuration. A range of optical Tx wavelengths is available around 1550 nm using DFB laser technology.

Dual standard SONET/SDH test for flexible product test

HP 37717C options, provide dual-standard testing to ANSI and ITU-T standards for both SONET and SDH up to 2488 Mb/s in a single instrument. Combined with DS1/DS3 and ITU-T PDH interfaces, the HP 37717C offers a truly worldwide test solution in one box helping network equipment manufacturers improve the flexibility of their production lines and reduce costs.

Deregulation has also increased the need to interface SONET to SDH networks. SDH networks therefore need to support North American DS1/DS3 (DSn) payloads and interfaces, and map them correctly into SDH according to the ITU-T standard G.707. The HP 37717C fully tests all the ITU-T G.707 mappings as well as testing the DSn/PDH circuits themselves.

The HP 37717C can check Automatic Protection Switch (APS) times on SONET/SDH rings and linear networks to Bellcore and ITU-T standards. (see page 19)

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